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Shortcomings in the Market for Developing Country Debt

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Creditors and highly indebted countries alike would benefit from a credit market in which penalties for default were heavier or more certain, in which multinational and international organizations were used to improve the flow of information about the debtor countries to possible creditors, and in which methods were designed to increase the precommitment of funds.

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It is important to deal with the immediate debt crisis in ways that do not harm the credit market, but efforts should be made to improve that market. The two chief problems limiting the market for developing country credit are unenforceable contracts and asymmetric information, according to Wakeman-Linn.

Instead of undertaking investments that could pay rates of return greater than the opportunity cost of their funds, creditors are financing investments in projects with lower rates of return but enforceable contracts.

Creditors and debtor countries alike would benefit if some method could be found to make loan contracts enforceable and to increase the flow (and quality) of information about the developing countries' ability and willingness to repay loans (including their susceptibility to penalties) and about how they intend to use the loan proceeds.

Short of creating an international court whose judgments are supported by an international army — which is highly unlikely — there is no way to make contracts in this market strictly enforceable. It should be possible, however, to improve incentives for developing countries to repay future loans.

Specifically, Wakeman-Linn recommends:

- Finding ways to increase the penalties for default, or making the penalties more certain. This would increase the debtor countries' willingness to pay, which would benefit all parties.

- Studying how to use existing multinational and international organizations to increase the flow of relevant information to potential creditors.

- Increasing precommitment of funds through increased penalties for default and other approaches. IMF contingency programs are already used extensively to establish some form of precommitment. Further use of international organizations along these lines may be possible. Mutually beneficial contracts are not currently possible because precommitment is not enforceable.

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by
John Wakeman-Linn

Table of Contents

I. Introduction

Governments regularly intervene in credit markets in an attempt to rectify market failures. The United States government, for example, guarantees loans for students in an attempt to overcome the effects of the legal prohibition against using the asset acquired -- human capital -- as collateral, and as an acknowledgement of the externalities in education. The establishment of the U.S. Farm Credit System was a response to a perceived failure of credit markets to adequately transfer "funds from the surplus areas of the Northeast to the funds-short farming regions of the West."[1] Governments intervene in home mortgage markets out of a belief that the market does not adequately address issues of equity or internalize social benefits of home ownership.

The list of credit markets in which governments intervene as a result of perceived or actual market failures is extensive. There is, however, at least one important credit market where intervention of this type has traditionally been absent -- the market for developing country debt.

This lack of intervention is not due to a perception that this market suffers from no shortcomings; indeed, the shortcomings in the market for developing country debt dwarf those in the mortgage market, for example. Rather, the lack of intervention is explained both by uncertainty as to what types of intervention would be

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[1]Webb (1980) p. 19. One explanation for this geographic immobility of funds was the difficulty of communicating information regarding opportunities and risk.

desirable, and by uncertainty over who should intervene when one of the parties to the loan contract is, either implicitly or explicitly, a national government itself. Clearly, if there is going to be successful intervention in this market to correct its shortcomings, and not just intervention in some transactions in this market to help individual banks or countries, the intervention will have to be undertaken by some international agency.

The response to the developing country debt crisis of the 1980's has removed one of the two areas of uncertainty mentioned above. The World Bank and the International Monetary Fund are clearly recognized as the appropriate agencies for addressing problems in this market.[2] The question of what sort of intervention is desirable unfortunately still lacks a clear answer.

The issue of appropriate intervention really involves not one but two questions: What should be done about the immediate crisis we are facing? And what should we do to improve the future functioning of this market? A great deal has been written on the first question, and I make no effort with this paper to shed further light on that subject.

Providing insight into the second question -- how do we make the market for developing country debt function better, in the sense of providing Pareto superior outcomes -- is the focus of this

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[2]For example, according to Ernest Zedillo (1986), "Except for a few cases, debt arrangements have been explicitly linked to the design of and compliance with Fund-supported stabilization programs. It is not an exaggeration to say that...the Fund has regained its foremost position in the handling of problems affecting global financial stability." (p. 132)

paper. Specifically, in this paper I attempt to describe the nature of the various shortcomings in this market and explain in detail the implications of each of these failures for loan quantities, interest rates, maturities, investment, utility, etc. Much existing work, designed primarily to focus on other questions, nonetheless sheds light on the questions central to this paper. Thus part of the task of this paper is simply to synthesize the insights of these various authors. Since, however, none of these works analyzes the general implications of the shortcomings in this market, there are substantial gaps in these insights. Thus the major task of this paper is to add to the known implications of these shortcomings with findings of my own, present all this as one coherent story and prove mathematically that all the assertions are correct and mutually consistent.

It is worth noting that, while academic economists clearly recognize the importance of the shortcomings in this market, as is made clear in the discussion of numerous works below, it is not clear that all economic policy makers have yet to recognize this importance. Thus some policy makers show little concern for addressing the weaknesses inherent in this market. Three examples will highlight this point.

First, Manuel Johnson, Vice Chairman of the Board of Governors of the Federal Reserve System, in discussing the international debt crisis, said "there is broad consensus that we have a...problem because...borrowers and lenders agreed to loans that appeared rational...These loans turned out to be problems when real interest

rates shifted sharply upward at the same time export revenues ...became substantially less than anticipated." (Johnson, 1987, p. 3). His further discussion of what is needed for resolving this crisis says nothing about improving the functioning of the market itself.

Second, in the Federal Reserve Bank of New York Annual Report for 1987, Frydl and Sobol argue that managing the LDC debt problem has "two major and interrelated goals: (1) to improve LDC economic and financial performance with a view toward sustaining economic growth and...restoring...creditworthiness...and (2) to reduce the vulnerability of the international banking system to risk on LDC loans." (Frydl and Sobol, 1987, p. 6). No mention is made by them of any need to improve the functioning of the market itself.

Finally, Gerald Corrigan (1988), President of the New York Federal Reserve Bank, listed what he believes are the five requirements for success in dealing with the debt problem; none of his requirements involve addressing market shortcomings.

Thus at least as far as some important members of the Federal Reserve System are concerned, the significance of the problems discussed below are either not recognized or not acknowledged. The objective, therefore, of this paper is to describe carefully the significance of these market shortcomings for the participants and others concerned.

In Section II, I deal with the main problem in this market -- the unenforceability of contracts. The nature and extent of the problem is described. The limited ability of creditors to overcome

the problem is discussed. Finally, the implications of the problem for loan quantities, interest rates, maturity structures, and the nature of economic activity in the borrowing country are described. One important result presented in this section is that unenforceability can explain the perverse timing of credit flows to developing countries; i.e. the fact that loans flow into these countries during high income periods, and out during low income periods.

In Section III, I undertake the same analysis regarding the problem of asymmetric information. Here, however, we must be careful to distinguish the nature of the information about which there is asymmetry. Thus I analyze the effects of asymmetric information regarding ability to pay, willingness to pay and use of the loan proceeds.

In Section IV I combine the findings of the previous sections, highlighting the general implications of the market shortcomings, and draw some tentative conclusions regarding the nature of optimal interventions in this market. Finally, in the Appendix, I present a model which I use to prove the accuracy and consistency of the various arguments -- both those culled from other authors and those new observations -- presented in this paper.

II. UNENFORCEABILITY

II.a. The Nature of the Problem

Developing countries borrow for several reasons; according to Eaton and Gersovitz (1982), there are four primary reasons

countries borrow: to smooth consumption relative to income, to invest if returns domestically exceed the world cost of funds, to facilitate international transactions and, on a temporary basis, to ease transition to a permanent shock. These motives are not unlike the motives for borrowers in many other credit markets.

However, as indicated above, the market for developing country debt is different from the market for other debt for several major reasons. The most important of these differences is the fact that the debt is unenforceable.

In most credit markets, if the borrower refuses to pay, the lender can take the borrower to court. As long as the borrower is solvent, the courts will force payment of the debt, even if the borrower must liquidate assets to do so. In the market for developing country debt, however, such an option does not exist for creditors.

If a developing country defaults on a loan, there is no court that has both the jurisdiction and the enforcement power to force the developing country to pay the loan. The implications of this situation for the LDC credit market are enormous. Imagine, for example, a mortgage market in which no court could force borrowers to pay back their loan.

While it is customary to do so, to state that these loans are strictly "unenforceable" is actually stating the problem a bit too strongly; creditors do have limited enforcement options. As Bulow and Rogoff (1986) point out, creditor claims do have standing in Western courts. Thus a defaulting country's ships and planes,

goods and money in transit, and assets abroad may be subject to seizure. This potential seizure power does not, however, resolve the unenforceability problem.

As Gersovitz (1985) notes, while North Korea has serious debt problems, it still successfully engages in international trade. When it makes payments, no effort is made to seize them in the process of transition. Indeed, only in the case of Iran in 1979-80, according to Gersovitz, has any attempt been made to seize assets abroad to pay debts.[3] Thus, for whatever reason, creditors aren't using the limited enforcement powers they do have.

Hellwig (1986) provides a possible explanation for this failure on the part of creditors to use their enforcement powers. He points out that the use of enforcement powers suffers from a time consistency problem: At the time the loan is made, the creditor wants to threaten the most serious possible penalties in case of default. At the time of default, however, the creditor wants to avoid taking the debtor to court; this would effectively require the creditor to write down the value of the debt on his books to zero, a result which banks want to avoid.

Further, even if these "enforcement" procedures were fully utilized, it is not at all clear this would make the loans enforceable. The penalty a country suffers from default may be

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[3]Clearly, even the case of Iran is not a demonstration of banks independently choosing to use existing enforcement powers to collect on defaulted debt. Politics and political pressure presumably played a major role in causing banks to use enforcement powers in this case.

quite small relative to the debt owed. As Bulow and Rogoff (1986) observe, debtor countries can choose between paying the loan, not paying and incurring whatever costs are imposed through seizure abroad, or not paying and reverting to autarky (actually, in a more realistic setting, this last option would be, after defaulting, trading only with countries who will make no attempts to enforce outstanding debt claims).

Nordhaus (1986) points out that countries have yet another option. Because in equilibrium the borrower will be relatively indifferent between defaulting and paying, while the lender will be very concerned that the loan is repaid, borrowers can use this leverage to negotiate a partial default. Nordhaus argues that the incentives are such that we should never see a complete default; it seems to me that the incentives are such that complete repayment of a loan is also unlikely. Lomax (1986) points out that this potential for partial default is somewhat constrained by the fact that banking laws prevent creditors from making concessions that depart too much from normal commercial terms.

Could collateral requirements help resolve this unenforceability problem? Even if, as mentioned above, mortgages were unenforceable, if creditors could effectively use the house as collateral the loan would be virtually enforceable. Could the same solution work in the market for developing country debt?

Unfortunately, the answer is no. As Eaton, Gersovitz and Stiglitz (1986) point out, there is no credible opportunity for providing collateral in this market. Collateral held in the debtor

country cannot be seized in the case of default; collateral held abroad is of no value to the borrower, so the portion of a loan which is collateralized is of no value to the borrower.

Thus, as Eaton and Gersovitz (1982) argue, any loan agreement must be what they refer to as time consistent, or incentive compatible. It must be the case that after the loan is made, it is still in the interest of the borrower to pay the loan back. More precisely, at the time the loan is made, the lender must believe that after the loan proceeds have been dispersed it will remain in the interest of the borrower to repay the loan.

Indeed, as Gersovitz (1985) points out, the enforcement problem is the key problem with regard to repayment of developing country debt. He notes that there are only three possible reasons for payment difficulties with any loan: either the borrower lacks the resources to repay, or the borrower has a temporary liquidity problem, or the borrower simply refuses to repay.

In the market for developing country debt, the first problem -- solvency -- is irrelevant. Gersovitz (1985) and Eaton, Gersovitz and Stiglitz (1986) argue that countries virtually always have sufficient resources to repay their loans; their net worth is positive.[4]

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[4]This may not be true for what Mohammed (1986) refers to as the "official borrowers" of sub-Saharan Africa. However, since this paper is focusing on the market for developing country debt, the borrowers we are concerned about are those Mohammed refers to as "market borrowers".

Temporary liquidity problems should not cause payment problems either, so long as the problem is correctly perceived by the creditors. Creditors in this case would simply make additional temporary loans to overcome the temporary liquidity problem.

Thus it is only if the country is unwilling to repay the loan (or is perceived to be unwilling to repay the loan) that we will have a payments problem. Creditors must take care to design contracts borrowers have an incentive to honor. We now turn to a discussion of the impact of this unenforceability problem on the loan participants and the nature of the loan agreement.

II.b. Impact on the Loan Participants and the Loan Contract

The most important observation pertaining to the unenforceability of these loans is that it unambiguously reduces the utility of the participants to this loan contract. As Guesnerie (1986) points out "commitment is always in a sense preferable to noncommitment...the noncommitment optimal contract can always (at least) be mimicked under commitment" (p. 518). Any contract that could be attained when commitment is not possible could also be attained when commitment is possible, simply by having borrower and lender agree to act as if commitment isn't possible. The reverse is not true; many contracts that can be agreed upon with commitment cannot be agreed upon in the absence of commitment.

Cohen and Sachs (1986) make this more specific by demonstrating that, when repudiation of debt is possible due to unenforceability, the maximum rate of growth the country can achieve is less than

when the debt is enforceable. Indeed, Eaton and Gersovitz (1982) observe that an increase in penalties for default in this market may actually increase the welfare of borrowing countries by making repudiation less likely.[5] And, as Swoboda (1985) notes, as the market is currently structured, borrowers cannot surrender the option of repudiation; effective and credible precommitment is not possible.

How does this decline in welfare and growth come about? To see this, we need to understand the specific effects the unenforceability has on the loan contract.

Krugman (1985) has likened the market for developing country debt to the general credit market described by Stiglitz and Weiss (1981). Kletzer (1986) has drawn comparisons between this market and both the credit market discussed by Stiglitz and Weiss and that described by Jaffee and Russell (1976). In both the Stiglitz-Weiss and the Jaffee-Russell notions of credit markets, the possibility of default results in endogenous equilibrium credit rationing. The total volume of loans is lower as a result of the possibility of

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[5]Borrowers would benefit from the increased penalties on new debt due to the lower interest rates and higher loan quantities available as a result of the reduced probability of default. Obviously, if penalties for existing debt were increased and all else was unchanged, borrowers would be worse off. But the Eaton and Gersovitz (1982) finding implies that a negotiated increase in default penalties and loan volume, and a reduction in interest rates, may also be a mutually beneficial way to deal with existing debt.

default.[6]

This decline in loan volume is not at all surprising. When the possibility of repudiation exists, as loan size increases, unless the potential cost of repudiation increases at least dollar for dollar, the probability of repudiation increases. The penalties, such as they are, that I have described for repudiation in the market for developing country debt are unlikely to increase dollar for dollar with loan size.

In a world of certainty, there would be some loan size above which repudiation is the preferred option for borrowers; loans would never exceed that amount. In the real world, with uncertainty, the probability that repudiation will be the preferred option for borrowers, at some point in the future, increases as loan size increases. Thus creditors, concerned about keeping the probability of repudiation low, will have an incentive to keep loan size low.

The impact of unenforceability on interest rates is even clearer. Since lenders have the option of making risk-free loans (e.g. United States Treasury bonds or bills), they will only make these risky developing country loans if the rate on these loans is sufficiently greater than the rate on risk-free loans. Thus the

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[6]In Jaffee and Russell (1976), each borrower receives a smaller loan as a result of the default probability then he would receive in absence of this default probability. In Stiglitz and Weiss (1981), some borrowers receive as much as they would have otherwise, while other borrowers receive none. However, Wakeman-Linn (1988) describes a variant on the Stiglitz-Weiss notion of credit rationing in which all borrowers receive some credit, but less than they would receive if the default probability was zero.

possibility of repudiation increases the rate these countries must pay.[7]

The unenforceability problem also affects the maturity structure of the debt. According to Guttentag and Herring (1983), "debt repayment schedules are related less to the capacity of the borrower to repay than to the need to influence the borrower's willingness to repay" (p. 217).

According to Kletzer (1986) maturities are shortened as a way of attaining enforcement power over some contract provisions. By requiring frequent renegotiations of the contract, the lender hopes to influence the borrower to use the funds in line with implicit or explicit contract provisions.

Gersovitz (1985) points out that, due to the unenforceability problem, individual creditors prefer shorter maturities, to facilitate their withdrawal from the market, should that become desirable.

Thus "loan maturities tend to be shorter than those that are optimal from the standpoint of repayment capacity" (Guttentag and Herring, 1983, p. 217).

We now turn to a consideration of the effects that unenforceability has on economic activity in the debtor country, particularly its effect on the level of investment. The earlier

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[7]It can easily be shown in the Jaffee-Russell model that interest rates are increasing in default probability. It can also be shown that, in the Stiglitz-Weiss model, interest rates when there is some positive probability of default are higher than when there is no probability of default.

observation of Cohen and Sachs (1986), that unenforceability reduces growth rates, would lead us to suspect that unenforceability lowers investment; we will see below that this conclusion is correct.

I have already shown that unenforceability lowers the volume of loans available to a country; thus all activities which would have been financed with that additional credit cannot be financed. Almost certainly some of these marginal activities would be investment activities.

Further, the increase in interest rates reduces investment. Any investment activities that pay an expected rate of return somewhere between the risk-free rate and the rate the debtor country has to pay are activities that will not be financed at this higher rate, but would have been financed at the lower rate.[8] Thus both the impact on loan quantity and the impact on interest rates tend to reduce the level of investment.

However, Atkeson (1988) argues that the optimal contract with unenforceability (and asymmetric information about use of the loan

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[8]This argument assumes the debtor country, at the time it takes out the loan and uses the proceeds, intends to repay the loan or has the same expectations as the lender regarding the probability of default. If the debtor intends not to repay the loan in full, or has different expectations than the creditor regarding the probability of default, the effective interest rate the debtor faces may be less than the risk free rate. It can easily be demonstrated in a model like those in the Appendix that, even in this case, investment would decline. Facing a binding credit ceiling, investment is determined not by the interest rate on loans. Rather, the level of investment is chosen to equate the marginal product of capital with the ratio of marginal utility of consumption across time periods. The declining loan volume will reduce investment.

proceeds) is one which calls for a net outflow of funds in times of low income; he shows in his model that such a contract will increase investment and reduce risk to the lender.

Atkeson's finding, that the optimal contract increases investment, hinges crucially on the fact that there is only one type of potential investment for borrowers in his model. As Gersovitz (1985) points out, in a market with unenforceable debt it is generally not clear that lenders will gain, in the form of reduced risk, from borrower investment. If borrowers invest in export oriented industries, or other areas which increase the borrower's susceptibility to penalties, risk falls and lenders are better off. But if, for example, lenders invest in import-competing industries or foreign exchange, this reduces the borrower's susceptibility to penalties and makes creditors worse off.

Since lenders have no effective way of binding borrowers in advance to a particular type of investment, lenders have no incentive to design a contract which encourages investment. Lacking such encouragement, the higher interest rates and lower loan volumes will discourage investment.

Finally, the unenforceability problem can explain a puzzle in this market. In general, in any credit market, we would expect borrowers to borrow when income is low, and repay the loans when income is high. Given declining indirect marginal utility of funds, any other result seems highly suspicious. However, the developing country debt market does not appear to work this way.

Indeed, the major criticism of Eaton and Gersovitz (1981) is the fact that the model assumes countries borrow in bad times and repay in good times. In fact, as Bulow and Rogoff (1986) and Gersovitz (1985) point out, countries do the exact opposite -- they borrow when income is high and pay it back when income is low. Why? The Atkeson (1988) story provides one possible answer -- contracts are structured this way to encourage investment. However, as discussed above, it is not clear that the Atkeson argument is applicable to a world with multiple investment opportunities for borrowers.

I would argue that there is a more fundamental cause of this perverse timing of credit flows, based directly on the unenforceability problem.

As Eichengreen and Portes (1986) point out in their analysis of the developing country debt and default problem of the 1930's, those countries who defaulted tended to be those who were hardest hit by declines in terms of trade and with greatest debt-service burdens relative to their income (and with most expansionary fiscal policies). Default risk is clearly higher in and following low income periods -- the welfare benefits of repudiation increase while the costs decline with declining trade. This is particularly true if there is any persistence in income shocks -- if a decline in income today lowers expected future income.

As both the Stiglitz-Weiss (1981) and Jaffee-Russell (1976) models show clearly, an increase in risk tends to reduce the optimal loan size. If countries are already at or above the creditors' perspective of optimal loan size, as a result of

declining income, the creditors may insist on net repayment.[9] While declining income makes borrowers wish to borrow more, concerns related to potential repudiation prevent lenders from satisfying those wishes. As Eaton and Gersovitz (1980) point out, most developing countries are credit-constrained, in the sense that they would like to borrow more at existing rates of interest than they are able to; those that are not credit-constrained have strong export performance (i.e. they are not suffering from serious negative shocks to income). And these credit-rationed borrowers cannot get additional funds by offering higher interest rates. Thus the perverse timing of the flow of credit to developing countries -- timing which aggravates the effects of income swings -- is a direct result of the unenforceability problem.

Thus unenforceability reduces loan volume, increases interest rates, reduces investment in the borrowing country, reduces the term of loans, reverses the timing of credit flows and reduces the utility of the borrowing country. All of these results are proven formally in the Appendix. In particular, I demonstrate in the Appendix that the decline in borrower utility stems both from a decline in expected consumption and from an increase in the variance of consumption. Let us now consider the effect of information asymmetries.

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[9]Obviously, demands for net repayment are unenforceable. Thus, creditors must be careful not to call for a net repayment large enough to make it in the country's interest to default immediately, even if such a net repayment is consistent with the terms of the loan contract.

III. INFORMATION ASYMMETRIES

There are three types of information about which asymmetry may potentially be important: information regarding ability to pay, regarding susceptibility to penalties and willingness to pay, and regarding use of loan proceeds. It is helpful to consider each of these types of information separately. First, however, we must clarify the distinction between ability to pay and willingness to pay.

What is meant in this paper by "ability to pay" is simply whether the country has sufficient resources to pay the loan, if it chooses to liquidate those resources. In this sense, a country may have the ability to pay its debts, but the government of that country may simultaneously be unable to pay the debts because political sentiment would not allow the liquidation of resources necessary to pay the loan.[10] For the purposes of this analysis, this latter problem would be classified as a willingness to pay problem. This distinction separates resource availability questions from questions of domestic attitude towards the debt and domestic resources.

III.a. Information About Ability to Pay

Often a creditor's major concern is the debtor's ability to pay

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[10]For example, it has been argued that Ecuador can and should sell its oil reserves to pay its foreign debt. The politics of such a policy proposal are clearly at least as important as the economics. For countries lacking a substantial reserve of a readily marketable commodity like oil, this argument presumes they nonetheless have internationally marketable assets.

the loan. This is logical; since most debt contracts are enforceable, as long as the debtor has sufficient assets to repay the loan, the creditor will get paid.

In the market for developing country debt, ability to pay is generally not a significant issue. As Eaton, Gersovitz and Stiglitz (1986) point out, countries are likely always to have sufficient resources to pay the loan. Whether they are willing to liquidate assets or do whatever else is necessary to generate the funds to pay the loan is a separate question; if they choose to pay the loan, they have the resources to do so. Thus, in general, asymmetries of information regarding ability to pay are irrelevant.

There are two important qualifications to this statement. First, Gale and Hellwig (1985) show that, when there are costs for the lender to observe the borrower's situation, asymmetric information regarding ability to pay guarantees that the standard debt contract is the optimal arrangement. Debt is preferable to equity in this situation because, with a debt contract, observation costs need only be incurred when the borrower claims an inability to pay the debt. With an equity contract, the observation costs must be incurred each period in order for the investor to be sure he is getting the appropriate payment. Thus asymmetric information about ability to pay helps explain the preponderance of debt, as opposed to equity, in LDC finance.

Second, Diwan (1987) shows that a fully state-contingent contract will maximize loan size. He cites the Mexican 1986 renegotiations, which made IMF loan size contingent upon the price

of oil, as a movement towards state-contingent contracts. Unfortunately, as Bulow and Rogoff (1986) point out, fully contingent contracts are not possible, since they would have to be contingent upon private information.

The implications of this information asymmetry are in general difficult to discern. Diwan proves, however, that loan size is lower due to the lender's inability to write fully contingent contracts.

III.b. Information Regarding Willingness to Pay

III.b.1 The Nature of the Problem

Since countries must choose to pay this unenforceable debt, the information of most relevance to creditors is information regarding susceptibility to penalties and willingness to pay. However, it is virtually impossible to accurately assess a country's willingness to pay.

Willingness to pay (and susceptibility to penalties) depends on a whole host of factors -- economic, political and sociological. Economic factors of relevance include a country's current economic situation, the importance of trade, the net indebtedness of the country, interest rates, and the movement of all these factors in coming years. As Eaton, Gersovitz and Stiglitz (1986) point out, these factors should not be a source of asymmetric information, since outside lenders are generally as well informed about a country's economic prospects as domestic politicians.

Political and sociological influences may be much harder to

assess, and equally, if not more, important. The nature of political pressures for reform and the attitudes of the nation's people and its leaders towards the debt clearly affect willingness to pay, yet the effect is hard to quantify.

As a result, we simply lack the ability to accurately assess this risk. Eaton and Gersovitz (1982) point out that, while lenders have developed statistical models to attempt to evaluate the safety of loans to particular countries, the models are not based on an accurate understanding of country risk. The investors can hardly be faulted for this failure; Guesnerie (1986) points out that contract theory provides us with no model capable of explaining this risk.

This inability to assess adequately the risk of these loans contributed to what many now believe to be the overlending prior to 1982. Guttentag and Herring (1984) argue that banks lent so much because they perceived the risk and covariance of such loans to be low; they were supported in this belief by economists. Eaton and Gersovitz (1981) and Goodman (1981) both argued that diversifying loan portfolios across LDC's was a valid approach, since according to Goodman, common risk is small relative to country risk, or according to Eaton and Gersovitz (1981), export performance across LDC's tends to be uncorrelated.

The experience of the 1980's demonstrates clearly the weaknesses in these arguments. The politics of trade and/or developing country recessions can effect all LDC's simultaneously; major shocks like the oil price changes of the 1970's and 1980's can

adversely effect large numbers of borrowers simultaneously; renegotiation with one country increases pressures for renegotiation with other countries.

We are not much better able to assess risk today then we were 10 years ago. As Guttentag and Herring (1984) point out, changes make estimates of risk based on past experience unreliable. Lacking theoretical models which are completely and accurately articulated, to help us explain the process of deciding whether to default or repay, we simply cannot accurately assess the risk of loans to any particular country.

III.b.2. The Impact on Loan Participants and the Loan Contract

Creditors in this market face both Knightian risk and Knightian uncertainty. There is some probability of default; this is the risk. Creditors price the loans so as to compensate themselves for taking on this risk. To this extent, the market for developing country debt is similar to the market for most forms of debt; there is almost always some risk, which lenders have to be enticed to accept.

The uncertainty, however, complicates both the lender's decision and our analysis. The uncertainty stems from the lender's inability to accurately discern willingness to pay and therefore probability of default. With lenders lacking accurate information regarding default probability, and knowing they lack such information, our analysis of this market is confronted with uncertainty as well.

What are the impacts on this market of the asymmetric information regarding willingness to pay and therefore default probability? That depends on whether lenders act on the basis of an estimated default probability which is greater or less than the true default probability.

If they overestimate the risk involved, interest rates will be too high, loan quantities too low, and investment and general economic activity in the borrowing country will be depressed. If they underestimate the risk, the opposite will occur.

Guttentag and Herring (1984) argue that banks will in fact underestimate the risk. Since banks have no accurate basis for assessing risk, Guttentag and Herring argue they must make subjective estimates of the risk. Analyzing the psychology of making such subjective estimates, they argue that disaster myopia, miscalculations and government guarantees will make lenders act as if there is virtually no risk involved in these loans.

If risk is overestimated, the equilibrium will be suboptimal. If lenders overestimate the risk, the high rates will prevent profitable (at rates which accurately reflect risks) investments from being undertaken.

If lenders underestimate the risk, Pareto comparisons are difficult to make. While investments will be financed on which true expected return to the lender is below his opportunity cost of funds, the expected return to the project itself exceeds this opportunity cost. Borrowers are better off due to the lender's error, the lender is worse off, and there may be no Pareto

improving trades possible.

III.c. Information About Use of the Loan Proceeds

III.c.1. The Nature of the Problem

Creditors are often concerned about what borrowers do with the borrowed funds, since that can have a substantial impact on the borrower's ability to pay the loan. In the market for developing country debt, creditors are concerned about the borrower's use of the loan proceeds since that may have a substantial impact on the borrower's willingness to pay the loan.

According to Eaton, Gersovitz and Stiglitz (1986), while concern for solvency should not cause creditors to be concerned about the use of the funds, they should care nonetheless about the use the funds are put to (and about other activities of the country after the loan is granted). The actions of the country can conceivably affect susceptibility to penalties or the likelihood of imposition of penalties, and by so doing effect the probability of repayment.

III.c.2. The Impact on Loan Participants and the Loan Contract

Ideally, creditors would like the option of making loans which constrained borrower behavior. Then borrowers and lenders could agree on a set of borrower behaviors that they would both find desirable. However, as Krugman (1985) points out, there is no possibility of effective and credible precommitment. Even if a contract was reached which constrained borrower behavior, it would suffer from the same unenforceability problems as the general

contract. And since creditors are concerned about borrower behavior in so far as it affects willingness to adhere to the unenforceable contract, such unenforceable precommitments would be of no benefit.

Without constraints on borrower behavior after the loan is made, lenders can be confident borrowers will act in their own self interest. This may involve borrowers taking actions which reduce their willingness to pay. This aggravates the unenforceability problem, and has all the effects on the loan contract and the participants that unenforceability itself has: lower loan quantities, higher interest rates, shorter maturities, lower investment, a perverse timing of credit flows and lower general utility.

Indeed, the discussion of the Atkeson (1988) argument for timing credit flows to influence investment levels was focussing precisely on the issue of the use of loan proceeds as it affects willingness to pay. And the Kletzer (1986) argument for shorter maturities similarly focused on attempts to influence the use of loan proceeds.

IV. CONCLUSION

The problems of unenforceable contracts and asymmetric information unambiguously result in a Pareto inferior equilibrium. Investments which pay expected or even certain rates of return greater than the opportunity cost of funds to creditors are not being undertaken, while investment projects with lower rates of

return are being financed elsewhere with enforceable contracts. All parties to the loan contract, as well as anyone else interested in the economic well-being of these debtor countries or their creditors, could be made better off if some method could be found to make the contracts enforceable, and to increase the quantity and quality of information the creditors receive.

It is important that we deal with the immediate crisis of the 1980's, and do so in ways that are do not adversely affect the future functioning of this market. But we should at the same time be attempting to improve the market.

While there is no way to make the contracts in this market strictly enforceable, barring the improbable creation of some international court whose judgments will be supported by an international army, it should certainly be possible to increase the incentives for the developing countries to repay future loans.

Specifically, if we could find ways to increase the penalties for default, or make the penalties more certain, this would increase willingness to pay, to the benefit of all parties.

Further, we should be looking for ways to use the existing multinational and international organizations to increase the flow of information relevant to these contracts.

Finally, a little creativity, combined with increased penalties for default, may enable us to increase the extent of precommitment regarding the use of funds. Extensive use is already made of IMF contingency programs as a way of establishing some form of precommitment. Further use of international organizations along

these lines may be possible, allowing mutually beneficial contracts to be written which are currently not possible due to a lack of enforceability regarding precommitments.

APPENDIX

The purpose of this Appendix is to demonstrate mathematically that the claims made above, regarding the effects of unenforceability and asymmetric information, are accurate. Thus I describe, not a realistic model of the market for developing country debt, but a simple credit market capable of demonstrating the effects of these problems. Each result is proven in the simplest model possible, for greatest clarity of exposition. It is easy to show that all results hold in the most general of the models presented.

I begin by describing the enforceable, complete information version of the model. The economy under consideration is a simple two period economy. The market consists of two types of agents: borrowers and lenders. Borrowers choose consumption, investment and loans to maximize utility. Specifically, borrowers solve

$$\begin{array}{lll} \text{Maximize} & U(C_1, C_2) & \\ L,\ I & \text{Subject to:} & C_1 \leq Y_1 + L - I \\ & & C_2 \leq Y_2 + F(I) - RL \end{array}$$

where C_i is consumption in the i^{th} period, Y_i is exogenous income in the i^{th} period, L is loan size, I investment, R the gross rate of interest paid on loans, $F(\cdot)$ and $U(\cdot,)$ the production and utility functions, respectively. Both $F(\cdot)$ and $U(\cdot,\cdot)$ are assumed to have positive first and negative second partial derivatives, with the first derivative evaluated at zero equal to infinity. Finally, to simplify the analysis of the unenforceable version of

the model, $U(\cdot,\cdot)$ is assumed additively separable in its arguments

Lenders are assumed to be risk neutral, to have a source of funds available to them at rate R^D, and to have two loan options: a perfectly safe bond, B, paying the exogenous rates $R^s > 1$, and loans to the borrower. Lenders allocate the funds available to them across bonds and loans, in a way which maximizes their expected income. It is assumed that supplies and demands are such that lenders hold both bonds and loans in equilibrium; this implies that R must be equal to R^s.

Letting U_i' denote the first derivative of utility with respect to C_i, and F' denote the first derivative of the production function, the borrower's problem implies both

1) $U_1'/U_2' = R\ (= R^s)$ and

2) $U_1'/U_2' = F'$

This assumes $R^s \geq F'$ when $L = 0$, so borrowers do take out loans.

Equations 1) and 2) describe the equilibrium in this market. Borrowers invest up to the point where $F' = R^s$, and they borrow an amount sufficient to make the ratio of the marginal utilities of consumption also equal to R^s.

Let me now make the contract unenforceable. Instead of borrowers automatically paying off the loan, they pay off the loan if and only if it is in their interest to do so. Specifically, it is assumed that if borrowers default on their loan in period 2, they incur a penalty P_2, where P_2 is the realization of a random variable p, with density function g(p) defined on the closed interval [0,P]. P_2 is observed at the start of period 2, prior to the borrower's

decision to pay back the loan or default.

The borrower's problem is now the following:

Maximize $E(U(C_1,C_2))$

L, I Subject to: $C_1 \leq Y_1 + L - I$

$C_2 \leq \text{Max } (Y_2+F(I)-RL,\ Y_2 +F(I)-P_2)$

Clearly the borrower will default whenever $P_2 < RL$.

The risk neutral lender will now make these loans only if they pay an expected rate of return equal to R^s. Thus R must satisfy

$$3)\quad R \int_{p=RL}^{P} g(p)dp = R_s$$

Several facts are immediately obvious from equation 3). First, since the integral of g(p) from RL to P is ≤ 1, and strictly less than 1 if $RL > 0$, $R > R^s$, which demonstrates that the unenforceability increases the interest rate on these loans. Second, since the default probability is increasing in L, or more precisely the set of states in which the borrower defaults is increasing in L, the interest rate is also increasing in L.[11]

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[11]Actually, it is technically possible that R is decreasing in L. The sign of dR/dL is the same as the sign of $- RLg(RL) + \int_{p=RL}^{P} g(p)dp$. We restrict our attention in this Appendix to those density functions g(·) for which this is positive. This is not a severe restriction on our model. If, for example, g(·) was the uniform density function, this formula would become (P-2RL)/P, which is positive as long as RL < P/2. If, however, RL > P/2, that would imply a loan on which the borrower chooses default over half the time; this is hardly realistic. So, for reasonable density functions and parameters of the model, it is safe to assume dR/dL > 0.

Returning to the borrower, we can now specify his problem as

$$\underset{L,\ I}{\text{Maximize}} \quad U_1(Y_1 + L - I) + \int_{p=0}^{RL} U_2(Y_2 + F(I) - P_2)g(p)dp + \int_{p=RL}^{P} U_2(Y_2 + F(I) - RL)g(p)dp$$

Solving this problem, and letting U'_{2n} be the derivative of utility with respect to C_2 in those states when the borrower does not default, we find

4) $U'_1/U'_{2n} = F'$ and

5) $U'_1/U'_{2n} = (R + L(\partial R/\partial L)) \int_{p=RL}^{P} g(p)dp$

Note that 3) and 5) together imply that the ratio of marginal utility of consumption in period 1 relative to period 2 is greater than R^s, implying that C_1 has increased and/or C_2 has decreased (in the nondefault states). Further, since F' is also greater than R^s, it is clear that I has declined relative to the model with enforceability.

What can we say about loan volume, L? We know that either C_1 has decreased or that C_2 (when the borrower does not default) has increased, or both. For $C_1 = Y_1 + L - I$ to decrease when I decreases requires L to decline. For $C_2 = Y_2 + F(I) - RL$ to increase when I decreases and R increases also requires L to

decline. So L is clearly lower than in the enforceable case.

Further, since "growth" in this model stems solely from investment, the decline in investment means a decline in growth.

Finally, can we say anything about the utility of the borrower? Expected consumption across the two periods, in both models, is $Y_1 + Y_2 + F(I) - (R^s-1)L$, since in both cases the expected payment to the lender is R_sL. While I is lower in the unenforceable case, L is also. We know from above that $F(I) - RL$ is lower in the unenforceable case than in the enforceable case, so $F(I) - (R^s-1)L$ is as well. Thus total consumption across the two periods is also lower.

The unenforceability has increased the variance of second period consumption (from zero to some positive number) while lowering total consumption, making the risk averse borrower unambiguously worse off. Even if the borrower were risk neutral, or slightly risk loving, he would be worse off.

This proves the assertions made in the text that unenforceability increases interest rates, reduces loan size, reduces investment, reduces growth of the borrowing country and in general reduces utility.[12] To prove the assertions regarding maturity and the timing of credit flows requires a slightly more complex version of

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[12]It is easy to see that an increase in penalties would increase borrower utility in this model. An increase in default cost P in all states of the world would make possible a reduction in R, an increase in L, and an increase in I. Consumption would be less variable, and expected consumption would increase. In the extreme, a sufficiently high default cost in all states of the world would effectively duplicate the enforceable version of the model.

the model.

To deal with the question of the maturity of the loan contract, I must extend the model to three periods. For expositional simplicity, I will describe a deterministic version of the model, with no uncertainty.

First let us consider the borrower, when there are no loans made. The borrower lives for three periods, and attempts to maximize utility of consumption across those three periods. The borrower has access to income Y, a one-period savings technology and a two-period investment opportunity. Specifically, the borrower solves

$$\begin{aligned} &\text{Maximize} && U(C_1,C_2,C_3) \\ &S,\ I && \text{Subject to: } C_1 \le Y - S - I \\ & && C_2 \le S \\ & && C_3 \le F(I) \end{aligned}$$

The solution to the borrower's problem involves S and I such that $U_1'/U_2' = 1$ and $U_1'/U_3' = F'$.

Introducing loans to the model, the borrower's problem becomes

$$\begin{aligned} &\text{Maximize} && U(C_1,C_2,C_3) \\ &\text{Subject to: } && C_1 \le Y - S - I + L \\ & && C_2 \le S \\ & && C_3 \le F(I) - RL \end{aligned}$$

Note that with $R > 1$, it can never be optimal to borrow in period 1 to finance savings for period 2 consumption, so all loans are used to finance investment. Assuming that $F' > R$ when there are no loans made, so that loans are undertaken, the solution to the borrower's problem involves S, I and L such that $U_1'/U_2' = 1$,

U_1'/U_3' = F' and F' = R. The loans facilitate additional investment, and additional consumption in all periods.

I now introduce unenforceability into the model. Again, as before, borrowers pay off the loan only if it is in their interest to do so. However, I now assume that borrowers can choose between two investment technologies, and the choice effects the penalty they incur for defaulting. Specifically, if they invest in technology g (for "good"), the penalty for default is some known high level P. If they invest in technology b (for "bad"), the penalty for default is 0.[13] Borrowers can invest in only one technology, and the return to their investment is identical regardless of the chosen technology, except for its impact on default cost.

It is relatively easy to show that all the effects described earlier -- higher interest rates, lower loans, lower investment and lower utility -- will result from the unenforceability. What happens to the maturity structure? With enforceability, all loans are two period loans. Let us consider whether two period loans are possible with unenforceability.

Lenders would obviously like borrowers to invest in technology g. But, just as the loan itself is unenforceable, there is no way for the lender to force investment in a particular type of technology. It will be optimal, from the borrower's perspective,

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[13]Actually, any default penalty less than P, and less than the R times the desired loan amount, is sufficient for the claims that follow.

for the borrower take the loan, invest in technology b, and default on the loan.

Knowing this, lenders will not make any loans. And borrowers cannot effectively commit to invest in technology g; lacking enforcement powers, the lender knows that any such promises will be violated by the borrower as soon as the loan is made. So there will be no two period loans.

It is possible to use a sequence of one period loans to resolve this problem. Suppose the lender offered to make a loan, due in period 2, and agreed to renew the loan in period 2 provided the loan proceeds had been invested in technology g. Let us assume the cost of default in period 2 is exogenously P; that is, any attempts to reduce the cost of default do not succeed until period 3. How would the borrower respond? He has three options.

The borrower could accept the offer and invest in technology g. Assuming P is greater than RL, this effectively returns us to the enforceable case.

The borrower could reject the offer. But this would be optimal only if L = 0 was optimal in the enforceable case, and we assumed this was not the situation. So the borrower will not reject the offer.

Finally, the borrower could accept the offer and invest in technology b. In this case the loan would have to be paid back in period 2. Effectively the loan would have been used to finance savings, which paid a return $1 < R$. It can never be optimal to borrow funds at a cost greater than the return one gets from the

use of those funds, so borrowers will not choose this option.

Thus the sequence of one period loans will be undertaken. As argued in the body of the paper, maturity of the loans will be reduced, in order to influence borrower behavior, as a result of the unenforceability.

The final claim in the body of the paper, regarding the effects of unenforceability, is its impact on the timing of loans. I will now prove that unenforceability can result in credit flowing into the borrowing country during high income periods, and out during low income periods.

Consider the following variant on the model of this Appendix. Borrowers, concerned about maximizing utility of consumption over three periods, have income in the first period and access to one-period investment technology. They borrow in the first period to finance consumption and/or investment, pay these loans back in the second period and borrow again. Specifically, they solve

$$\text{Maximize} \quad E(U(C_1, C_2, C_3))$$

$$I_1, I_2, L_1, L_2$$

$$\text{Subject to:} \quad C_1 = Y - I_1 - L_1$$

$$C_2 = F_1(I_1) - I_2 + L_2 - R_1 L_1$$

$$C_3 = \max(F_2(I_2) - R_2 L_2;\ F_2(I_2) - P)$$

Note that borrowers pay in the third period only if it is in their interest to do so.[14] $F_i(\cdot)$ is random, in the following way; $F_i(I_i)$

[14]Conceivably the model could include the option of default in the second period as well. However, since there would be no uncertainty regarding second period default costs, banks would never lend so much as to make second period default optimal; all this would add to the model is that borrowers might be credit-

$= (a_i + ei)Ii^7$, where e_i is a random number with $E(e_i) = 0$, and $a_i = a_{i-1} + .5(e_i)$. Thus there is persistence in the shocks to productivity. Income in period 2 greater than expected results in increased expected period 3 income.

Finally, P is assumed to be an increasing function of output in period 3. This is not an unreasonable assumption; the penalties that exist for developing countries who default tend to be penalties on trade. In general, trade is more important to a developing country, and thus the potential penalties more severe, the greater is income.

It is easy to demonstrate that desired loans L_2 are decreasing in shocks to income; that is, a negative shock to income in period 2 increases loan demand in period 2.[15] Thus, in absence of credit constraints, credit flows in the usual manner: the greater is borrower income in period 2, the lower are net loans to the borrower. Embedded in a model with a greater number of periods, net borrowing would tend to be positive when income was low, and negative when income was high.

But I have argued above that the unenforceability of contracts results in credit constraints, and I have shown that credit flows tend to be the opposite of that just described. I now will use the model to explain this latter fact.

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constrained in period 1. This would not effect our conclusions regarding timing of credit flows.

[15]If the shocks were perfectly persistent, it would not be clear that loan demand increased when there was a negative income shock.

If borrowers are credit-constrained, in the sense of Stiglitz-Weiss (1981) or Jaffee-Russell (1976) or Eaton and Gersovitz (1980), they are borrowing, not as much as they desire at existing interest rates, but as much as lenders will provide. When there is a negative shock to income in period 2, that reduces the expected value of P, the cost for defaulting, in period 3. Knowing this, lenders will reduce the volume of loans they are willing to make.

Thus, when income is unexpectedly low in period 2, loan volume will decline. In a many-period model, credit will flow into the country when income is high, and out when income is low -- the opposite of borrower's wishes.

This completes the proof of claims regarding the effect of the unenforceability of the contracts. I now turn to the effect of asymmetric information.

Recall from above my argument that since solvency is not a problem, asymmetric information regarding ability to pay is not a problem. Asymmetric information regarding use of the loan proceeds matters in that it effects the enforceability of the contract; the effects of this were demonstrated above, particularly with respect to the maturity of the loan contracts. So all that remains is to demonstrate the effect of asymmetric information regarding willingness to pay.

Let us return to the earliest specification of the model, discussed above. With P_2 distributed according to density function g(p), let the lenders incorrectly assume it is distributed

according to density function G(p).[16] Equation 3) would then include G(p), instead of g(p). Depending upon the differences in these two functions, R might increase or decrease.

If G is such that lenders underestimate susceptibility to penalties, R will be higher as a result. It is easy to see that this would reduce L, I, growth and borrower utility. If lenders overestimate the susceptibility to penalties, the opposite will occur.

Finally, we cannot be certain as to the welfare effects of an overestimate of susceptibility to penalties. Clearly the lender is worse off while the borrower is better off due to this error, but with riskless I and a lower bound to R of R^s, it is not clear that a Pareto improving allocation exists.

It is clear, however, that loan contracts based on lenders' underestimate of susceptibility to penalties result in a Pareto inferior equilibrium; the opportunity cost of funds is less than the expected return on investment projects which are not being financed. Thus it is theoretically possible to reallocate funds in a way that improve's everyone's utility.

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[16]I will assume lenders act as if G(p) is the true density function; even if they know it is not the correct density function, it summarizes all information they do have.

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